Eastern Corridor Major Roads Study

State Planning Commission
Main Roads Department
Shire of Mundaring
Shire of Swan

Report and Recommendations
of the
Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 380 March 1989

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ISSN 1030-0120

ISBN 0 7309 1934 X

CONTENTS

		Page
	SUMMARY AND RECOMMENDATIONS	iii
1.	**INTRODUCTION**	1
2.	**SUMMARY OF PROPOSALS**	1
3.	**ENVIRONMENT AND PLANNING CONTEXT**	4
3.1	EXISTING ENVIRONMENT - SUMMARY	4
3.2	PLANNING CONTEXT	6
4.	**REVIEW OF PUBLIC SUBMISSIONS**	6
5.	**ENVIRONMENTAL ASSESSMENT**	7
5.1	GENERAL	7
5.2	GREAT EASTERN HIGHWAY	8
5.2.1	LAND ACQUISITION AND PROPERTIES AFFECTED	8
5.2.2	VEGETATION AND WILDLIFE	9
5.2.3	CHIPPER'S LEAP	9
5.2.4	OTHER	9
5.3	CAMERON ROAD DISTRIBUTOR - HILLS SPINE ROAD	9
5.4	ORANGE ROUTE AND TOODYAY ROAD	10
5.4.1	GENERAL.	10
5.4.2	LAND ACQUISITION AND PROPERTIES AFFECTED	10
5.4.3	VEGETATION AND WILDLIFE	13
5.4.4	HYDROLOGY AND WETLANDS	14
5.4.5	CONSERVATION AREAS AND SYSTEM 6 RESOURCES	14
6.	**CONCLUSIONS AND RECOMMENDATIONS**	14

APPENDICES

1	Preliminary Routes
2	Chapter 16 Recommendations
3	Environmental Management Measures
4	Conservation Reserves in the Eastern Corridor
5	Summary of Main Issues in Private Submissions
6	Proponents Response to Issues Raised
7	Supplementary Paper on Alternatives North of the Orange Route

TABLES

		Page
1.	Land and Property Requirements - Great Eastern Highway Schemes	9
2.	Land and Property Requirements - Orange and Blue Routes.	11
3.	Summary of Affected Vegetation Areas - Blue and Orange Routes	13

FIGURES

1.	Recommendations	2
2.	Location of the Eastern Corridor	5
3.	Werribee Road Locality	12
4.	Balance of Land in Rahnie Road and Werribee Road Locality	12

SUMMARY AND RECOMMENDATIONS

A proposal for a major road system in the Eastern Corridor of the Perth Metropolitan Region has been put forward by the joint proponents, the State Planning Commission, Main Roads Department, Shire of Mundaring and the Shire of Swan.

The proposal is for an upgrading of the Great Eastern Highway, the development of a Hills Spine Road by extending Cameron Road, and a new route referred to as the Orange Route in combination with an upgrading of Toodyay Road.

A Public Environmental Report was determined as the appropriate level of environmental assessment under Part IV of the Environmental Protection Act.

The Environmental Protection Authority has concluded that the proposal to establish a future major road system as described and explained in the Public Environmental Report is environmentally acceptable in principle and that it can proceed to detailed design and Metropolitan Region Scheme amendment, providing that the proponents ensure that all undertakings described in the Public Environmental Report are implemented and that all environmental management measures outlined are undertaken. Bearing in mind that it is likely to be some time before the proposal is implemented, it is further concluded that any major variations from the proposal as assessed be referred to the Authority for further consideration under the provisions of the Environmental Protection Act.

The detail recommendations of the Authority are as follows:

RECOMMENDATION 1

The Environmental Protection Authority concludes that the proposal to establish a future major road network in the Eastern Corridor comprised of:

- **Great Eastern Highway as a primary distributor route;**
- **the Hills Spine Road by extending Cameron Road eastward and westward; and**
- **the Orange Route in combination with Toodyay Road;**

as described in the Public Environmental Report is environmentally acceptable subject to all commitments described in Chapter 16 of the Public Environmental Report being implemented, and subject to all environmental management measures outlined in Chapter 17 being undertaken at the appropriate time, and recommends that the proposal could proceed to detailed design and Metropolitan Region Scheme amendment.

RECOMMENDATION 2

The Environmental Protection Authority recommends that the proponents should, at the appropriate time prior to construction, and consistent with the findings of this Assessment Report, provide to the Authority's satisfaction details of:

- **areas of natural vegetation to be removed and retained, once final carriageway alignments and route variations from those indicated in the Public Environmental Report are known;**

- measures to protect rare and endangered species;

- dimensions and areas of land to be removed from Reserve 2145, John Forrest National Park, and the proposed northerly extensions to John Forrest National Park;

- the dimensions, including elevations and cross sections to indicate visual consequence and land area required, of major proposed earthworks;

- all landscaping, replanting and rehabilitation plans, including those associated with construction works;

- creek crossings, modification of existing water courses and hydrology, and method of disposal of run off into the natural drainage system;

- noise attenuation methods along the routes, and especially in the Wooroloo - Wundowie locality;

- measures taken to minimise the disruption caused by construction to adjacent landowners and affected residents; and

- any other aspect of environmental significance associated with the proposals which subsequently arises.

RECOMMENDATION 3

The Environmental Protection Authority recommends that suitable measures be taken to the satisfaction of the Minister for Planning, to preserve or relocate sites of historic or cultural significance with special reference to the site of Chipper's Leap,

RECOMMENDATION 4

The Environmental Protection Authority recommends that any environmentally significant variations in the proposed road reserve alignments or location of major intersections from the proposals as assessed be referred to the Environmental Protection Authority.

1. INTRODUCTION

Discussions concerning a major new road system for the Eastern Corridor commenced as a part of major planning studies in the mid 1970's. Early initiatives between 1978 and 1981 to amend the Metropolitan Region Scheme and reserve a new highway route between Mundaring and the Perth Metropolitan Region boundary near Wooroloo resulted in opposition from the community and a request by the Environmental Protection Authority for a detailed environmental report. The required level of environmental assessment subsequently set by the Authority was a Public Environmental Report.

In 1985, the Metropolitan Region Planning Authority commissioned the Eastern Corridor Major Road Study in association with the Main Roads Department, and the Shires of Mundaring and Swan. These four agencies and local authorities are the proponents of this review, with the Metropolitan Region Planning Authority now superceded by the State Planning Commission.

The objectives of the study were to assess the future major road needs of the Eastern Corridor, and to prepare plans to define the land requirements of any identified proposals sufficiently to allow amendment to the Perth Metropolitan Region Scheme when appropriate. The detailed terms of reference for the study were to:

(i) define the primary east-west traffic routes within the Eastern Corridor between Roe Highway and the metropolitan region boundary;

(ii) define the proper functions for the primary routes; and

(iii) establish design standards for these routes.

A preliminary report was produced in December 1986 summarising the first stage of the study. The first stage established that of six possible options (Appendix 1), two should be examined in further detail.

The final Planning Report, which for the purpose of environmental assessment is taken in its entirety as the Public Environmental Report, was released for public comment in March 1988. The period for public review extended to the 30 June 1988.

Issues raised in public submissions were analysed and passed onto the State Planning Commission and a formal response to these was received in November 1988.

This report has been prepared following consideration of the combined Planning Report and Public Environmental Report, the submissions received as a result of the public review of the Public Environmental Report, and various information provided by the proponents.

2. SUMMARY OF PROPOSALS

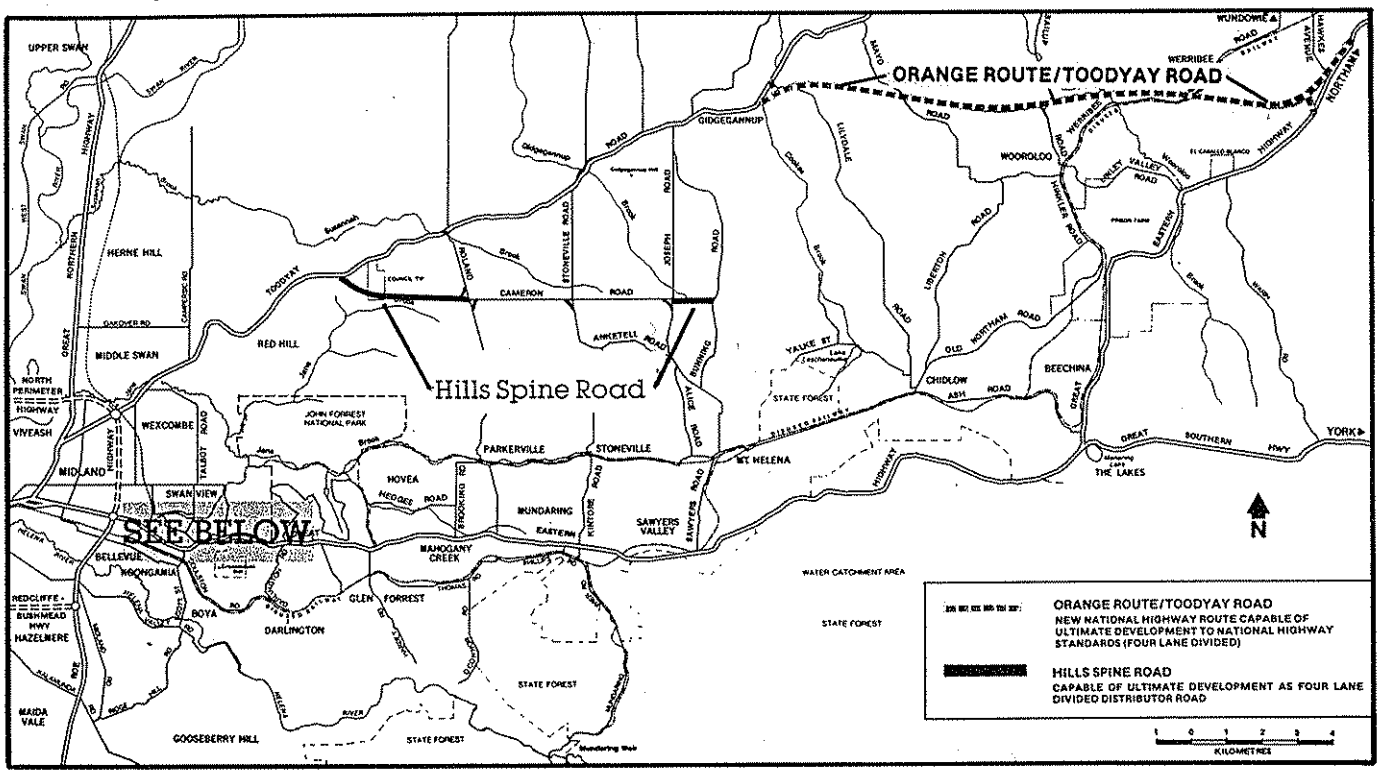
The Eastern Corridor Major Road Study report makes three principal recommendations in terms of the future major road network required for the Eastern corridor. These are: (see Figure 1 and Appendix 2).

(i) Great Eastern Highway be a primary distributor route;

(ii) an alignment known as the Orange route in combination with part of Toodyay Road be a new National Highway; and

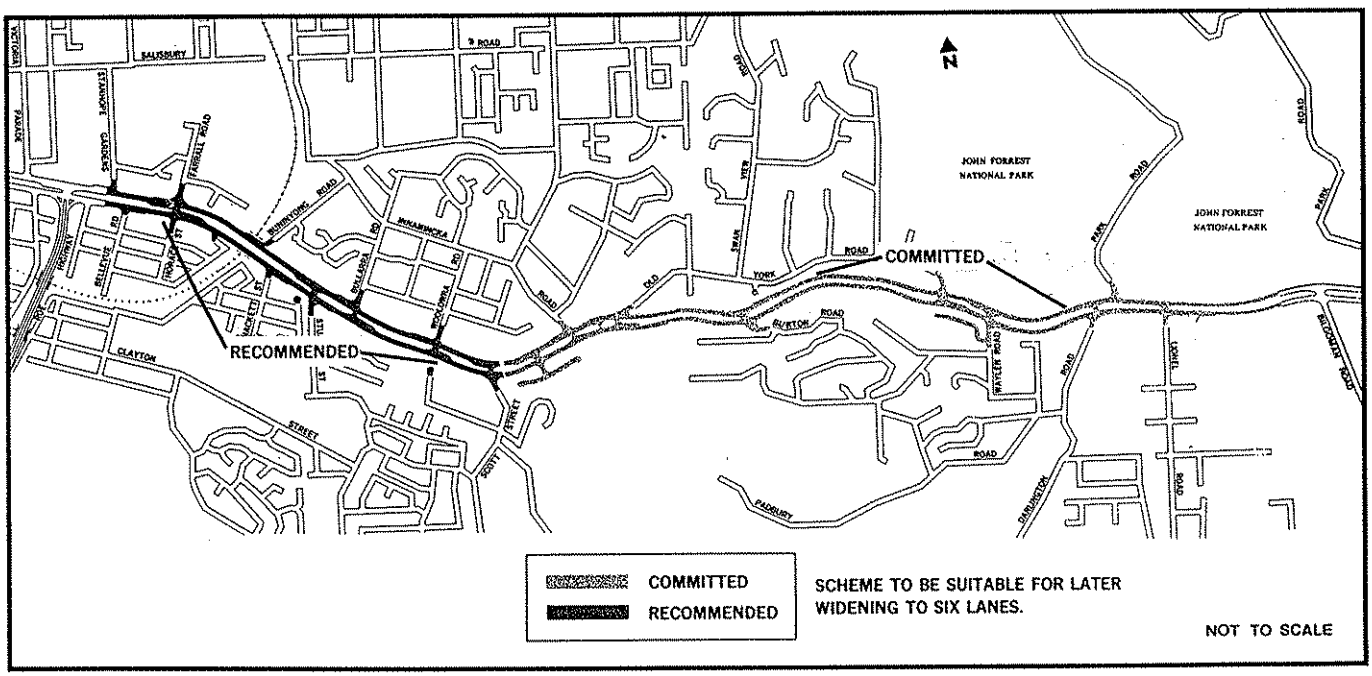
THE RECOMMENDED ROUTES

Orange Route and Hills Spine Road


ORANGE ROUTE/TOODYAY ROAD
Hills Spine Road
SEE BELOW
ORANGE ROUTE/TOODYAY ROAD
NEW NATIONAL HIGHWAY ROUTE CAPABLE OF ULTIMATE DEVELOPMENT TO NATIONAL HIGHWAY STANDARDS (FOUR LANE DIVIDED)
HILLS SPINE ROAD
CAPABLE OF ULTIMATE DEVELOPMENT AS FOUR LANE DIVIDED DISTRIBUTOR ROAD
KILOMETRES

Courtesy of the Main Roads Department.

Great Eastern Highway Roe Highway to John Forrest National Park



Courtesy of the Main Roads Department.

Design and layout by the State Planning Commission Promotions Branch.
Photography courtesy of the Main Roads Department.

Figure 1. Recommendations.

(iii) a distributor route (either local or district) be formed by extending Cameron Road eastward and westward, and linking up with Toodyay Road, and to be referred to as the Hills Spine Road.

The study then makes a number of additional recommendations with respect to design standards, staging, timing and implementation. These are, in summary, as follows:

- with regard to the Great Eastern Highway, that the section from Scott Street to the Roe Highway connection be upgraded during the early to mid 1990's to a four-lane divided road, with the provision for a potential widening to six lanes depending on traffic growth by around 2010 or thereafter;

- with regard to ii) above, the report recommends a new, high standard single carriageway road be constructed on the Orange route alignment, commencing at about the turn of the century. The route would be suitable for upgrading to national highway design standards, if and when necessary. It is envisaged that this would eventually be four-lane highway capacity, the timing depending on development and traffic growth;

- with regard to iii) above, it is envisaged that the new distributor road would be developed at around the turn of the century, depending on development and growth rates of the northern part of the Eastern Corridor. Initially, it should be single carriageway road with provision for possible upgrading to a four-lane divided road if eventually required;

- the report advocates that all recommendations are made subject to current planning reviews by state and local government which could change the strategic planning needs for the study area;

- in terms of implementation, the report recommends the following actions:

  (a) to proceed with the detailed design of the Great Eastern Highway upgrading between Roe Highway and Scott Street as soon as possible;

  (b) the upgrading of Toodyay Road west of Darling Scarp to be studied further;

  (c) to review with the Commonwealth Government, the current national highway design standards, to seek a reduction of certain requirements (eg grade-separated interchanges);

  (d) to include the Orange route as a controlled access highway reserve in the Metropolitan Region Scheme; and

  (e) to determine the precise land requirements for the Hills Spine road as soon as possible, and ahead of further subdivision in the locality.

In addition, in Chapter 17 of the Public Environmental Report entitled 'Environmental Management Implications', the report advocates a number of initiatives that should be taken to reduce the impact of the proposals, and to achieve integration with the surrounding environment. (See Appendix 3).

3. ENVIRONMENT AND PLANNING CONTEXT

3.1 EXISTING ENVIRONMENT - SUMMARY

The Eastern corridor extends from the sub-regional centre of Midland, eastward along and to the north of the Great Eastern Highway alignment to the Wooroloo and Wundowie localities on the boundary of the Perth Metropolitan Region. (Figure 2)

The most westerly portion of the study area around Guildford and west of the Darling Scarp, coincides with eastern portion of the coastal plain. This includes the geomorphic units of the Pinjarra Plain characterised by the alluvial soils of the Guildford Formation, and the Ridge Hill Shelf which forms the foothills of the Darling Scarp and colluvial soils of variable character.

The study area includes the Darling Scarp itself, with steeply incised valleys, shallow soils and frequently exposed granite. By far the greatest extent of the study area is nevertheless, the Darling Range environment of undulating upland formed of Precambrian granite with a capping of deeply weathered laterite, and many deeply eroded valleys, often with steep sides, exposed granite, and with fertile alluvial valley floors.

The study area features a number of important water catchments including those of the Susannah Brook, Jane Brook, Wooroloo Brook, and Helena River, though only the latter is presently utilised for public water supply purposes. There are, in addition, numerous intermittent, seasonal water courses forming a texture of narrow minor valleys throughout the area.

Although the study area coincides with a predominantly cleared portion of the Darling Ranges north of the existing State Forest, there is nevertheless a significant degree of dispersed and varied remnant vegetation cover, and many sizeable and extensive individual stands of natural vegetation. The extent and composition of the vegetation cover is not only important in itself, but contributes greatly to the environmental stability and landscape quality of the Eastern Corridor environment. Some 21 plant communities have been recorded in the area, reflecting the variation in terrain and soils. These include four different Wandoo (Eucalyptus wandoo) communities, a range of wetland plant communities, two Yarri (E. patens) communities, Sheoak (Allocasuarina sp) woodlands, and heath communities on the Darling Scarp. There are in addition a number of rare flora, though it should be noted that a great deal of additional survey work would be required to accurately determine the exact incidence of all rare flora.

Fauna in the study area is varied. Some 96 bird species, 28 mammal species, 15 amphibian species and 57 reptile species have been recorded in the area and would be expected to occur in the areas surveyed, especially in association with water courses, wetlands and all uncleared stands of native vegetation. There are in addition seven species of fauna either recorded or potentially present, that are gazetted or otherwise in need of special protection under the Wildlife Conservation Act.

The Eastern Corridor Study Area also contains ten existing or proposed Conservation Reserves that are subject to System 6 Recommendations (See Appendix 4).

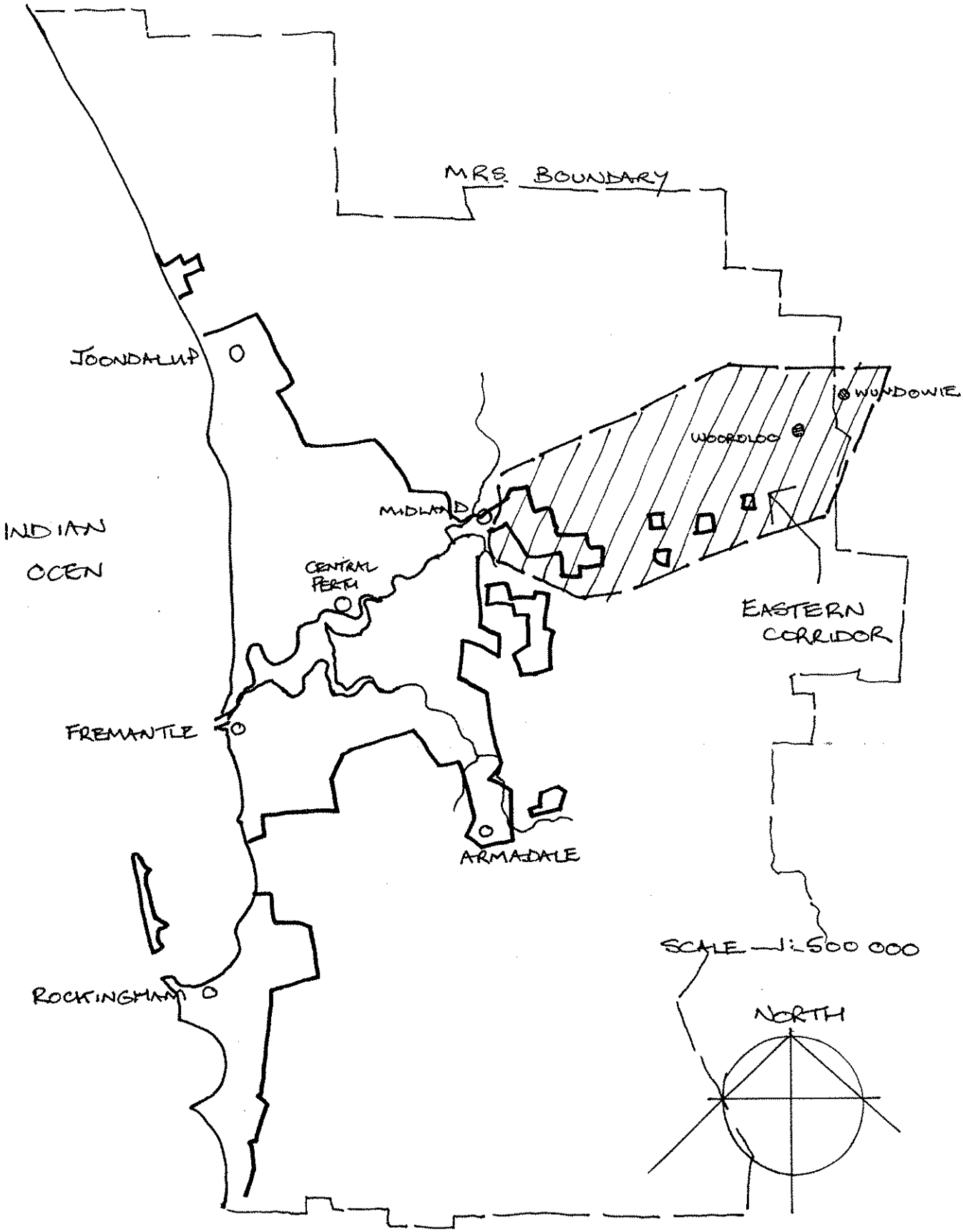


Figure 2. Location of the Eastern Corridor.

Land use in the study area varies, ranging from predominantly built urban environment west of the Darling Scarp, through to a series of distinct hills settlements east of the Scarp. Larger tracks of semi-cleared rural land supporting both traditional rural agricultural activities occur in the northern and eastern zones, and more varied uses (hobby farms, orcharding, horse agistment etc), in the southern zone between the main settlements. The hills settlements, such as Mundaring, Mt Helena, and Chidlow, tend to be focussed along the existing transport routes of the Eastern Corridor, including the old railway reserves.

3.2 PLANNING CONTEXT

The Corridor Plan (1970) identified an eastern growth corridor. Subsequent regional planning studies*, as well as local authority Structure Plans, have established that incremental growth based on the existing settlements, together with a gradual intensification and diversification in non-urban land use that is compatible with the hills landscape and environment, will prevail over the coming decades, or until a major change in planning strategy occurs.

While the Eastern Corridor has in the past, and will in the foreseeable future, have a slower rate of growth (expected to be 5% per year) than Perth's other development corridors, it is recognised as essential to provide for the long term major transport routes well in advance of development. These will serve both the future population and development of the area, and provide a suitable entry into the Perth region for the National Highway system, hence catering for both interstate and intra state (goldfields and central wheatbelt) traffic.

As discussed in Section 2 of this report, implementation of certain parts of the proposal will require amendment to the Metropolitan Region Scheme to include the necessary reserved land (eg Controlled Access Highway for the proposed Orange Route). It can be anticipated that the upgrading and construction of the road system as proposed will in turn have a considerable effect on the subsequent pattern of land use and development in the Corridor. The overall package of proposals includes both immediate actions (Metropolitan Region Scheme amendment and design work), through to long term recommendations.

4. REVIEW OF PUBLIC SUBMISSIONS

The Environmental Protection Authority has reviewed approximately 80 out of a total of 93 public submissions received by the State Planning Commission. Of these, two were major submissions received from the Orange Route Action Group and the Greenmount Action Group. The former includes copies of an open letter signed by 151 residents objecting to the Orange Route.

A summary of main issues raised in public submissions (see Appendix 5 for the full list) is as follows:

- several submissions expressed the view that the Public Environmental Report uses misleading traffic and demographic projections, that practical alternative routes were not considered, that the community was not adequately consulted, and that certain findings are inadequately justified;

Reference:*. R Taylor and W Burrell : Perth's Eastern Corridor MRPA, February 1978.
. Metropolitan Region Planning Authority : Eastern Corridor - Preferred Strategy, August 1984.

- some submissions claimed that the study underestimates directly and indirectly affected properties, and the adverse economic impacts that will be experienced by affected property owners;

- certain submissions claimed that in traffic and engineering terms, the recommendations are impractical or unacceptable;

- the Public Environmental Report is accused of underestimating visual impacts, and that visual impact assessment was biased towards road users rather than affected land owners;

- the majority of all submissions complained that the Orange route, especially, would severely disrupt and impact upon a quiet, rural environment and the associated community;

- specific concerns expressed in numerous submissions from the Wooroloo district included:

  - loss of secluded lifestyle;
  - severence of a community;
  - disruption and destruction of tranquil rural lifestyle;
  - uncertainty, and inability to relocate now the proposal is known; and
  - far wider effect upon the Wooroloo and Wundowie district community than the report supposes;

- the Public Environmental Report is considered by several submissions to have underestimated the potential loss of productive land, and to have ignored the productive value of alternative rural land use;

- the Public Environmental Report is considered to underestimate the effect of traffic noise impacts in a rural environment with extremely low ambient noise levels;

- a number of submissions considered that unacceptably high vegetation clearance and wildlife disruption will occur; and

- concerns were expressed at the potential for disturbance of natural drainage systems, and the risks of polluting water catchments.

The proponent's response to these issues is included in Appendix 6.

5. ENVIRONMENTAL ASSESSMENT

5.1 GENERAL

In undertaking an assessment of the Eastern Corridor Major Road Study proposals certain factors were taken into account.

First, as previously stated, the study area is on the periphery of a major urban area, and has long been designated as an urban growth corridor, albeit that with the slowest anticipated rate of growth. It is to be expected that in the longest term substantial intensification of land use and spread of urban development will occur. The environment of the area will be progressively altered as a consequence.

Secondly, and following on from the first point, it is inevitable that over time there will be a substantial increase in traffic within the Corridor, and between the Corridor and the rest of the metropolitan region, as well as growth of both intra and interstate traffic entering and leaving the Perth region via the Eastern Corridor. It is essential to cater for this transportation need in an orderly way to minimise the various impacts arising from increased traffic.

Thirdly, it is inevitable that both the construction and operation (ie. use) of the major transport routes, as envisaged, will result in some impact upon the environment.

Fourthly, it is considered that the best approach to minimising overall environmental impacts of establishing a major new road system, is to plan for such routes well ahead of land use change and intensification.

The Authority believes that the ultimate development of the proposed major road system will be a major determinant of future land use in the area affected by the route. The Authority therefore reiterates previous advice contained in Bulletin 365, "The Kwinana Freeway Extension" December 1988, that the State Planning Commission should develop a suitable policy addressing land use adjacent to the proposed major highway system, particularly as it relates to traffic noise.

In consideration of the issues raised in public submissions, the Authority concludes many are principally an expression of social concerns (eg. impact on rural lifestyle, disturbance to a community). Notwithstanding that there may be a physical aspect to many social issues (eg. property severance), the Authority considers issues of an essentially social or community orientated nature should be resolved through the planning process rather than the environmental assessment process.

The Eastern Corridor Major Road Study represents comprehensive forward planning, well ahead of future growth and development. The Authority recognises that it is one of the most detailed studies of its type ever carried out by the State Planning Commission in the Perth Metropolitan Region. Furthermore, all relevant environmental factors were taken into account from the outset of the study.

5.2 GREAT EASTERN HIGHWAY

5.2.1 LAND ACQUISITION AND PROPERTIES AFFECTED

The proposals to further upgrade the Great Eastern Highway between the Roe Highway and Scott Street for either the 4 or 6 lane options as outlined in the Public Environmental Report, will result in the acquisition of existing residential land and the demolition of property. Although this is not strictly an environmental concern, there will nevertheless be a physical impact of some order upon the immediate environment at the time of demolition and construction. The extent of acquisition and development is illustrated in Table 1.

Various options exist as to the timing of property acquisition for either the four and six lane options, and the proponent argues that it will be possible to minimise the long term impacts of acquisition and demolition by selecting the most appropriate acquisition programme.

Table 1. Land and Property Requirements - Great Eastern Highway Schemes.

	SIX LANES 1st STAGE (4 LANES)	FINAL	FOUR LANES
Number of houses required[1]	26	40	15
Further houses possibly required[2]	10	14	16
TOTAL (maximum houses required)	36	54	31
total number of lots affected		128	74

Notes: 1. Less than 3m outside the new highway boundary.
2. Generally 3m to 7m outside the highway boundary.

(Source: Public Environmental Report page 87)

5.2.2. VEGETATION AND WILDLIFE

Road widening as proposed will mainly affect existing, developed private properties and loss of domestic garden and streetscape vegetation will occur. There will also be the possible loss of an unspecified but small portion of the southern fringe of John Forest National Park. It is expected that this loss will be slight (road widening width requirements) and is not regarded as contentious nor significant.

However, in view of the fact that the area involved is an historic National Park and a System 6 area (M29), the Authority will require details of the exact land take involved, to be forwarded for approval when the final design is completed.

Apart from these aspects, impact on vegetation and wildlife is considered negligible.

5.2.3 CHIPPER'S LEAP

A rocky outcrop between the Old York Road and Great Eastern Highway at Greenmount, known as 'Chipper's Leap', will be removed entirely with road widening to the 6 lanes option, but will remain unaffected by the four lane option. The Public Environmental Report points out that earthworks and re-alignment to avoid 'Chipper's Leap' would cost an additional $0.6 million and cause the removal of a further three houses. Although not strictly an environmental issue the Authority notes the option of a suitably designed plaque or plinth nearby with access provision for passing motorists. The Authority also notes that it may be possible to remove and relocate a portion of the original granite outcrop as part of a new memorial.

5.2.4 OTHER

In all other respects the Great Eastern Highway upgrading to either 4 or 6 lanes is considered environmentally acceptable.

5.3 CAMERON ROAD DISTRIBUTOR - HILLS SPINE ROAD

In the first stage 24 ha of land affecting 8 private lots and 1 public lot of mainly cleared land will be affected. Later widening, should this be required, will take a further 11 ha affecting 19 lots. No reserved land, and no known significant sites will be affected.

In terms of vegetation and wildlife, at the detail design stage it should be possible to minimise loss of vegetation along the route. The current estimate is that there will be loss of 1 ha of Jarrah-Marri Woodland, 2.5 ha of Jarrah-Marri-Banksia-Allocasuarina open forest and 11 ha of roadside land containing roadside vegetation. Finally, some 18 properties could be affected by substantial noise increases.

Impacts resulting from the construction of both the first stage and second stage of the proposed Hills Spine Road are considered environmentally acceptable, providing final design and the environmental management measures are taken to minimise noise impacts and loss of vegetation, as provided for in the Public Environmental Report.

5.4 ORANGE ROUTE AND TOODYAY ROAD

5.4.1 GENERAL

As stated in Section 1.0, the Public Environmental Report evaluates two alternative new route options (the Orange and Blue routes) that were in turn selected from six best possible options identified in the first stage of the road study.

The Public Environmental Report establishes that the Orange route is the preferred of these two options from an environmental point of view. It is also the least costly in constructional terms.

The Authority is mindful of the fact that the proponents have, owing to expressed objections at the proposed new section of the Orange route, considered a number of alternative northerly alignments in the Wooroloo-Wundowie locality, (Appendix 7: Supplementary Paper on Alternatives North of Orange Route, Travers Morgan Pty Ltd, June, 1988). That report has found these options to be:

- more costly;
- less functionally viable, to the extent that they may render construction of a new highway unjustifiable and defeat the basic study objectives; and
- no more environmentally acceptable.

5.4.2 LAND ACQUISITION AND PROPERTIES AFFECTED

For the first stage of the Orange Route (high standard single carriageway), a total of 298 ha of land and a total 26 private lots will be directly affected. For the final stage (four-lane highway) a further 247 ha and 90 properties will be affected.

Further details, and a comparison with the Blue Route are indicated in Table 2.

The Public Environmental Report acknowledges that the Orange Route can only be implemented "at a certain environmental, social and financial cost". In the response to issues raised (see Appendix 3,) the proponents state that "not withstanding these impacts, it (Orange route) is considered preferable to doing nothing, and meets the study objectives better than all other options considered".

Table 2. Land and Property Requirements - Orange and Blue Routes

	ORANGE			BLUE		
	1st STAGE	FINAL	TOTAL	1st STAGE	FINAL	Total
Land Area required (ha)						
Private	294	207	501	252	94	346
Public	4	40	44	100	55	155
TOTAL	298	247	545	352	149	501
Private lots affected (No)						
Whole	3	7	10	1	3	4
Part	15	82	97	22	34	56
Severed	8	1	9	11	-	11
TOTAL AFFECTED	26	90	116	34	37	71
Houses taken	1	12	13	1	2	3

(Source: Public Environmental Report, page 86)

The proponents also point out, and the Authority concurs, that many potential impacts, including the effect on rural amenity, can be reduced through careful design, construction and landscaping. The Authority therefore regards as critical the environmental management initiatives that the Public Environmental Report (Chapter 17) advocates should be taken if the recommendations are adopted.

Nevertheless the Authority considers the section of the Orange route alignment approximately between the intersection of Bailup Road, to the crossing over Werribee and Cheddaring Roads, to present particular difficulties. This locality has a high density of rural homesites, including some thirteen relatively small lots on the south side of Werribee Road (See Figure 3).

Given all the constraints considered the Authority accepts that this is the most practical alignment. However, the Authority considers that final design detailing, elevation of carriageway, and degree of cut and fill will be especially critical along this portion. It is the Authority's view that when all final design aspects are considered the following items should receive special consideration in achieving the solution that has the least adverse environmental effect on adjacent landowners:

a) where the Orange Route runs adjacent to Werribee Road, to ensure the lowest elevation possible of the carriageway, in order to minimise the visual and noise impacts of the proposed highway on adjacent land owners and nearby dwellings;

b) that consideration be given to the most appropriate use and management of the balance of land remaining between the proposed Orange Route alignment and Rahnie road (on the northern side), and the balance of land remaining between the proposed Orange Route alignment and Werribee Road (on the southern side) (see figure 4);

c) that such consideration include the opportunity for additional attenuation of traffic noise and visual screening of the carriageway from nearby properties.

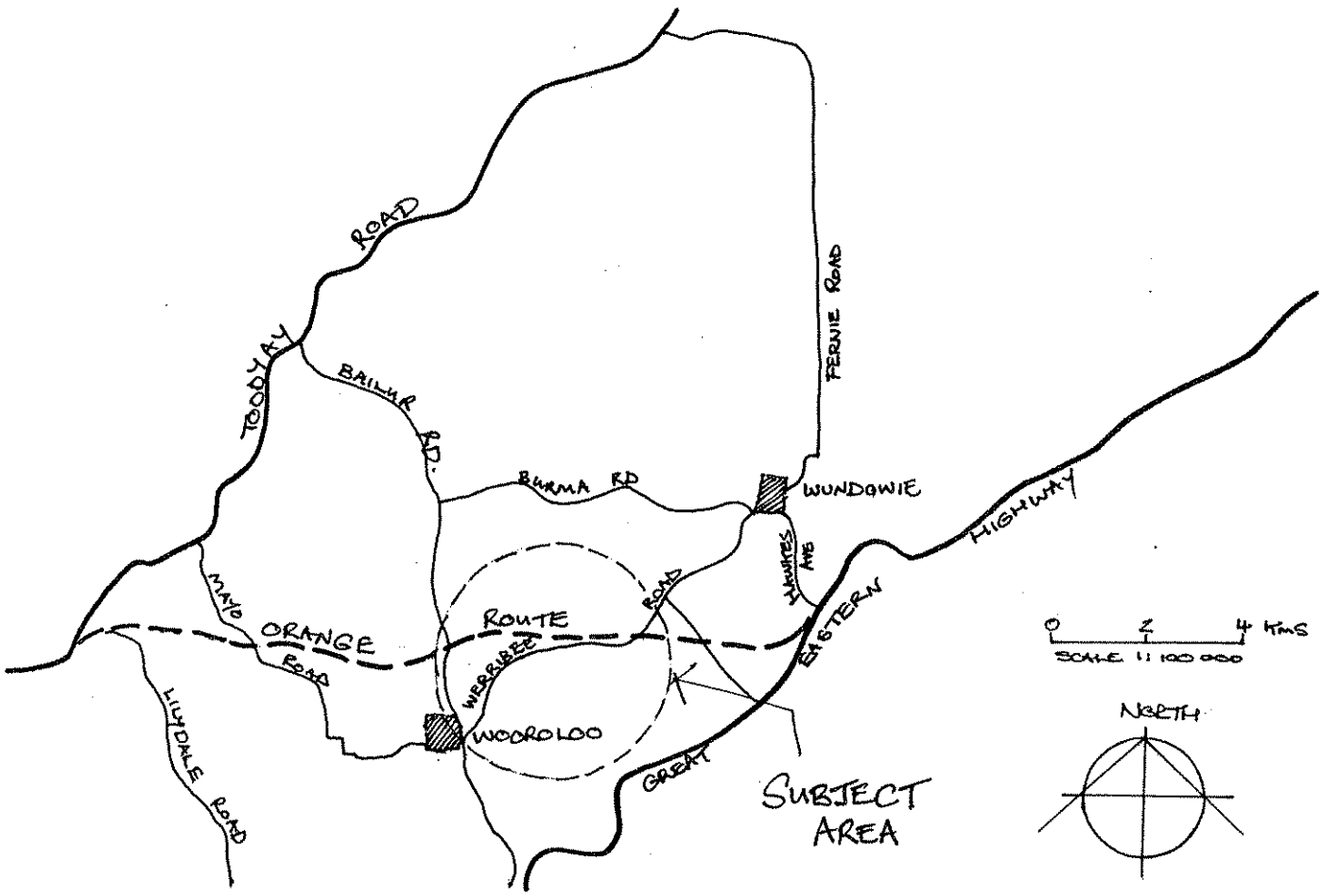


Figure 3. Werribee Road Locality.

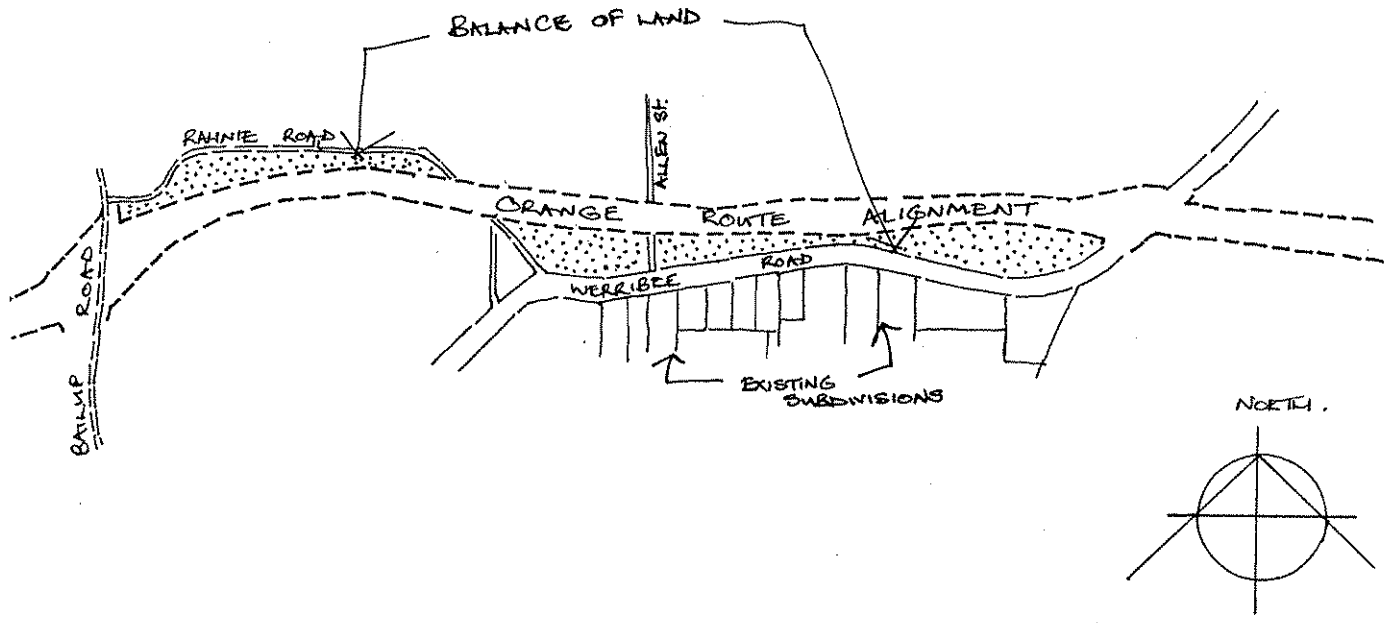


Figure 4. Balance of Land in Rahnie Road and Werribee Road Locality.

5.4.3 VEGETATION AND WILDLIFE

The Orange Route alignment will affect 35 ha of uncleared natural vegetation of various associations and 159ha of cleared areas containing various remnant vegetation associations in the first stage, and an additional 65 ha and 53ha respectively in the final stage. In the ultimate (final stage) development certain geographically restricted species could be affected (Hakea cristata, Beaufortia purpurea, Petrophile bilobata and Acacia barbinervis) however the degree of impact is as yet unknown being dependent on final design detailing of each stage.

A summary of affected vegetation is best illustrated by the following table:

Table 3. Summary of Affected Vegetation Areas - Blue and Orange Routes (areas to the nearest hectare)

VEGETATION TYPE	ORANGE ROUTE		BLUE ROUTE	
	1st STAGE	FINAL	1st STAGE	FINAL
Uncleared areas of native vegetation:				
Jarrah-Marri open forest/woodland	11	27	30	1
Jarrah-Marri-Bg-Af open forest	1	11	65	-
Wandoo woodland with Jarrah and Marri	18	1	11	37
Wandoo open woodland, some with Ah/Cq	-	7	-	7
Marrie-Wandoo (open woodland)	-	*	-	*
Yarri (open forest), some with Wandoo	4	1	-	-
Flooded Gum (woodland/open woodland)	3	4	1	7
Calothamnus quadrifidus heath	-	6	1	5
Allocasuarina huegliana (open woodland)	-	3	-	3
Agonis linearifolia (closed scrub)	-	2	-	-
Banksia littoralis-Marri woodland	-	3	3	-
Hakea varia (open shrubland)	-	*	3	-
TOTAL UNCLEARED AREAS	**35**	**65**	**111**	**60**
Cleared areas with the following remnant associations:				
Jarrah-Marri	81	35	43	1
Jarrah-Marri-Banksia-Allocasuarina	-	6	126	-
Wandoo, some with Marri and Jarrah	74	2	4	38
Marri-Wandoo	-	10	-	10
Yarri	5	-	-	-
Other cleared land (eg. gravel pits)	-	-	6	-
TOTAL CLEARED AREAS	**159**	**53**	**179**	**48**

NOTES 1. * denotes areas of less than one hectare.
2. totals may not agree due to rounding.
3. Bg-Af = Banksia grandis-Allocasuarina fraseriana;
Ah/Cq = Allocasuarina huegeliana/Calothamnus quadrifidus.
(Source: Public Environmental Report page 81)

It is the Authority's view that additional assessment of the precise impact on significant vegetation will be required at the detailed design stage.

The impact of the Orange Route on native fauna is mainly associated with loss of natural vegetation and wetland environments and is expected to be limited. The Public Environmental Report points out that the Orange Route alignment might result in disturbance to the habitats of certain rare and geographically restricted fauna (Crested Shrike-tit, Red-eared Firetail, and Numbat), but that the risk is far lower than that associated with the Blue Route. Final design detail, landscaping and road alignment will have a major bearing on the degree of impact.

5.4.4 HYDROLOGY AND WETLANDS

All route options inevitably cross and have some effect on various creek systems. The majority of crossings over minor creeks are considered manageable through appropriate design. The contentious impacts of the Orange Route are in connection with the crossings of Cookes Brook (Stage I), and Susannah Brook and its tributaries (Stage II), and the impact on local hydrology in the valley east of Gidgegannup in the vicinity of Lilydale Road.

The Authority accepts that alignments with the least environmental impact have been selected and supports the conclusion that with appropriate design solutions impact can be reduced to acceptable levels. Referral of subsequent details will therefore be necessary.

5.4.5 CONSERVATION AREAS AND SYSTEM 6 RESOURCES

The Orange Route will impinge to a limited degree on the northern edge of System 6 area M21 extension to John Forest National Park, mainly in the form of necessary road widening along the existing Toodyay Road alignment. In the final stage the Orange route will also require an unspecified portion of the north-west side of Reserve 2145 near Gidgegannup. No other reserves or System 6 areas are affected. The Authority will require details of the land area to be taken from Reserve 2145 and System 6 area M21 when appropriate, but on the expectation that the total area required is small the Authority considers the degree of impact on existing conservation areas and resources is acceptable in principle.

6. CONCLUSIONS AND RECOMMENDATIONS

The Authority considers that the proposals for a major road network for the Eastern Corridor as presented in the combined Public Environmental Report and planning report are, in combination with undertakings for various environmental management measures and subsequent referral of a variety of design details, environmentally acceptable.

The Authority considers that the proponents have undertaken a highly effective and comprehensive study which has taken account of relevant environmental concerns from the outset of the programme.

This has produced a report and contents that have essentially met the objectives and ideals of the environmental assessment process, and greatly assisted the task of the Environmental Protection Authority.

The Authority, in assessing the Eastern Corridor Major Road Study proposal, makes the following recommendations:-

RECOMMENDATION 1

The Environmental Protection Authority concludes that the proposal to establish a future major road network in the Eastern Corridor comprised of:

. Great Eastern Highway as a primary distributor route;

. the Hills Spine Road by extending Cameron Road eastward and westward; and

. the Orange Route in combination with Toodyay Road;

as described in the Public Environmental Report is environmentally acceptable subject to all commitments described in Chapter 16 of the Public Environmental Report being implemented, and subject to all environmental management measures outlined in Chapter 17 being undertaken at the appropriate time, and recommends that the proposal could proceed to detailed design and Metropolitan Region Scheme amendment.

RECOMMENDATION 2

The Environmental Protection Authority recommends that the proponents should, at the appropriate time prior to construction, and consistent with the findings of this Assessment Report, provide to the Authority's satisfaction details of:

. areas of natural vegetation to be removed and retained, once final carriageway alignments and route variations from those indicated in the Public Environmental Report are known;

. measures to protect rare and endangered species;

. dimensions and areas of land to be removed from Reserve 2145, John Forrest National Park, and the proposed northerly extensions to John Forrest National Park;

. the dimensions, including elevations and cross sections to indicate visual consequence and land area required, of major proposed earthworks;

. all landscaping, replanting and rehabilitation plans, including those associated with construction works;

. creek crossings, modification of existing water courses and hydrology, and method of disposal of run off into the natural drainage system;

. noise attenuation methods along the routes, and especially in the Wooroloo - Wundowie locality;

. measures taken to minimise the disruption caused by construction to adjacent landowners and affected residents; and

. any other aspect of environmental significance associated with the proposals which subsequently arises.

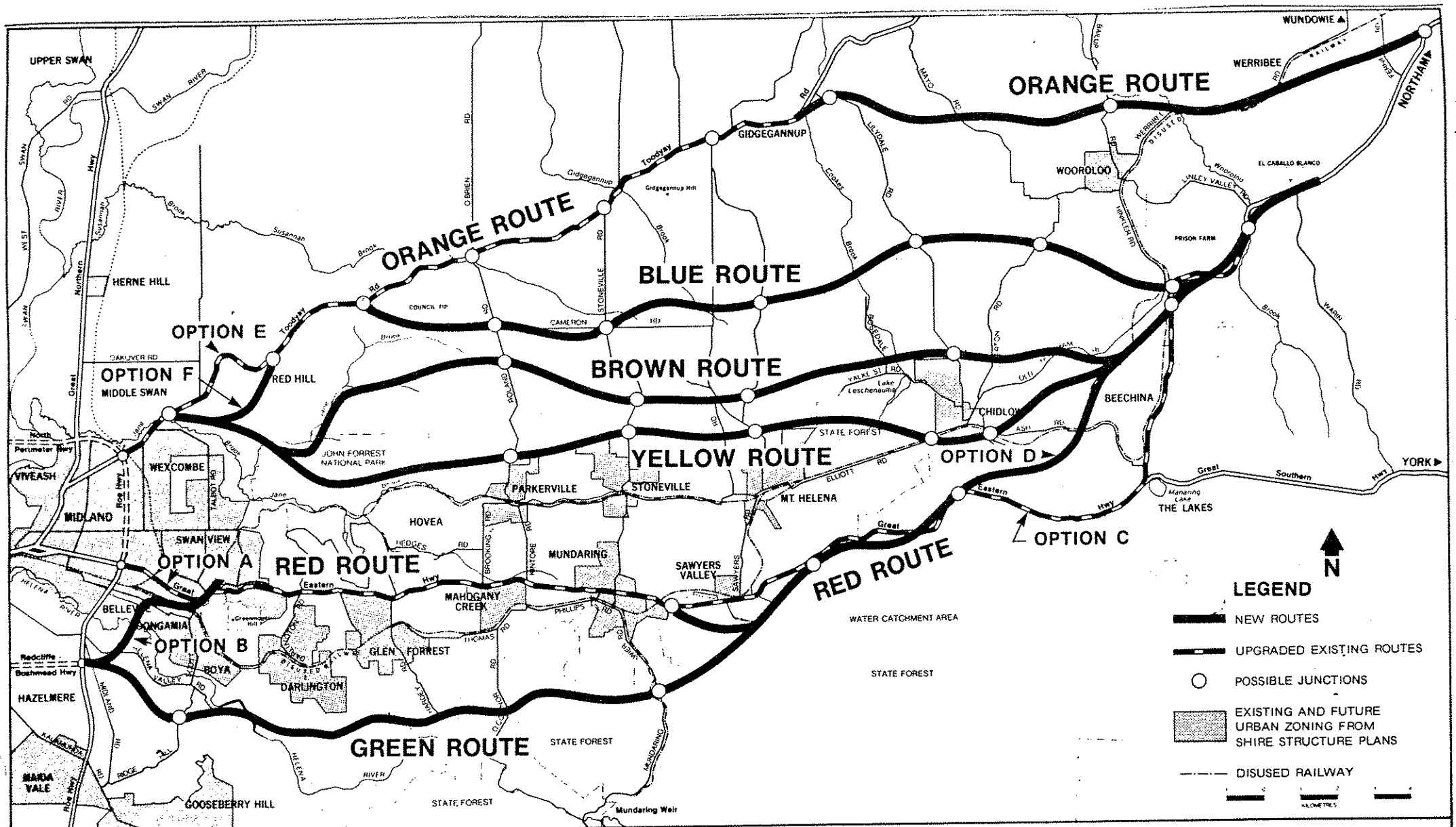
RECOMMENDATION 3

The Environmental Protection Authority recommends that suitable measures be taken to the satisfaction of the Minister for Planning, to preserve or relocate sites of historic or cultural significance with special reference to the site of Chipper's Leap,

RECOMMENDATION 4

The Environmental Protection Authority recommends that any environmentally significant variations in the proposed road reserve alignments or location of major intersections from the proposals as assessed be referred to the Environmental Protection Authority.

APPENDICES



THE PRELIMINARY ROUTES

APPENDIX 1

CHAPTER 16 Recommendations

THE FUTURE MAJOR ROAD NETWORK

It is recommended that the future major road network in the Eastern Corridor should comprise:

i Great Eastern Highway as a primary distributor route;
ii the Orange route and Toodyay Road as a new National Highway; and
iii a distributor route (local or district) formed by extending Cameron Road eastward and westward (the Hills Spine Road).

Road Standards, Staging and Timing

With respect to i above, Great Eastern Highway from the Roe Highway to Scott Street should be upgraded to a four-lane divided road to complement the works currently proposed east of Scott Street. This scheme will probably be required on traffic grounds in the mid-1990s but may be necessary earlier for safety reasons.

The schemes should allow for later widening to six lanes with the minimum possible overall impact.

With respect to ii above, a new, high standard single carriageway road should be constructed on the Orange route alignment, to provide a new route for the Perth to Adelaide National Highway via Toodyay Road to Perth's controlled access highway system around Midland. The new route would be suitable for eventual upgrading to national highway design standards. It is estimated that the project should proceed at about the turn of the century.

Finally, with respect to iii above, a new distributor road (the "Hills Spine Road") should be planned for the northern half of the Eastern Corridor. The road would be formed by extending Cameron Road westward to Toodyay Road at Red Hill, and eastward to Bunning Road. A single carriageway road would be adequate initially, but it should be suited to eventual construction as a four-lane divided road if there is any prospect of increased density of development in the northern part of the study area. The timing of the initial route depends upon the degree and pace of population growth in the immediate surroundings, but it shows significant traffic benefits in the year 2001 and should be considered for this time.

These three initiatives will provide an improved major road network for the Eastern Corridor which can be further developed in the next century.

Depending on the degree of traffic growth and the effect of diverting the National Highway, Great Eastern Highway at Greenmount could require six lanes by 2010.

The new National Highway route along Toodyay Road and the Orange route could be progressively upgraded to a four-lane highway, starting at the western end, as dictated by development and hence traffic growth. The details of the route west of the Darling Scarp should be determined in conjunction with the road network required for development of Wexcombe and Middle Swan.

These recommendations are made subject to the results of current planning reviews by state and local government, which could change the development strategy for the Eastern Corridor in the longer term.

Implementation

Recommended environmental management measures presented in the next chapter should be read in conjunction with the following paragraphs. Many of the management measures will require action prior to preparing any amendments to the Metropolitan Region Scheme, because land requirements may be affected. They will also need to be addressed as part of the ongoing formal environmental assessment of the recommended strategy.

The following actions are recommended:

* Detailed design of the first initiative, namely upgrading Great Eastern Highway to a four lane divided road from Roe Highway to Scott Street, should proceed as soon as possible. Strictly speaking this scheme does not require an amendment to the Metropolitan Region Scheme, because the current designation of the Highway as "other major highway" in the MRS allows land to be taken within a width of 80 metres. However, it would be desirable to determine and gazette the ultimate, six-lane land requirements (which are substantially less than 80 metres wide) without delay.

* The future upgrading of Toodyay Road west of the Darling Scarp, including its connection to the controlled-access highway network around Midland, should be studied further by the Main Roads Department and the Shire of Swan in conjunction with the road network required for development of Wexcombe and Middle Swan.

* The current national highway requirement for grade-separated inter changes appears to be an over-provision for the Orange route east of the scarp unless full urbanisation occurs. It is recommended that the need for these interchanges in the ultimate scheme should be reviewed with the Commonwealth Government and the design should be reduced if the national standard for interchanges can be relaxed.

* An amendment to the Metropolitan Region Scheme should then be prepared to include the Orange route as a controlled access highway reserve. Although the land required for ultimate upgrading to full national highway standards is not needed for some time, probably beyond current planning horizons, the full land requirement for the entire route should be defined in the MRS as soon as practicable.

* The concept for the Hills Spine Road should be adopted by Swan and Mundaring Shires, and a design should be developed so that the precise land requirements can be determined as soon as possible. This is particularly important because new subdivision applications are thought to be imminent for some of the areas along the route, and there is considerable scope for detailed changes to the currently-developed alignment.

The above recommendations on implementing the schemes are made in the context of present policies for reserving land in the Metropolitan Region Scheme. It is understood these policies are to be reviewed, possibly with the effect of reducing the reservation of land that is not needed for longer-term projects. Whatever the outcome of the review, it is strongly recommended that some form of positive protection is put on the land required. This is so that planning of continued development in the Eastern Corridor may proceed without the uncertainty for owners and occupiers that has existed to date. It should also allow existing uses to continue until land is required for road construction.

CHAPTER 17 Environmental Management Implications

This chapter outlines a number of initiatives that should be taken to reduce the impact of the recommended schemes on the environment and to integrate them into their surroundings, should the study recommendations be adopted. These initiatives are all classed as environmental management issues in the context of the Environmental Protection Authority's guidelines for the Public Environmental Report, and would need to be addressed in the continuing formal environmental appraisal process for any schemes taken forward.

GREAT EASTERN HIGHWAY SCHEMES

Design

A landscaping and planting scheme should be included in the detailed design, to provide relief for surrounding properties from noise and visual impacts wherever possible.

The need for cyclist and pedestrian routes along and across the route should be assessed and provisions made accordingly. Movements between residential areas and schools, the Undercliffe Hospital and the Greenmount Library and Hall should be considered. Crossings on the Highway should be included if and where appropriate.

The impact of the six lane widening scheme on Chipper's Leap is recognised as a serious effect. The feasibility of establishing a nearby memorial site should be investigated and discussed with interested parties.

Land Acquisition

A detailed land use policy should be prepared that identifies preferred uses and access arrangements for land alongside the Highway. The policy should concentrate upon the re-establishment of residential use for most of the land, but could also identify sites for local retail use and for landscaping, paving and planting to improve the civic amenities of the road surroundings and to mitigate noise impacts.

In conjunction with the above, special compensation measures for displaced residents should be investigated. Consideration should be given to changing current legislation so that sufficient funds can be provided to those that wish to rebuild further back on their remaining land. Some of the properties affected have been occupied by the same families for several generations, and the occupants should be given the opportunity to stay on their land if they so desire.

ORANGE ROUTE

Design

If the long term provision of grade separated junctions is not required (subject to a relaxation of the national highway design criteria), the impact of the Orange route at junction sites can be substantially reduced. The design of the route should be reviewed in this event.

All new creek crossings along the route should be designed to avoid disruption to natural drainage regimes and hence creek vegetation and habitats. Bridges may prove preferable to culverts at some locations.

Detailed design of road drainage should include careful selection of run-off points into watercourses to minimise the risk of pollution from road run-off.

Measures should be taken to avoid or minimise the loss of restricted species of vegetation located alongside the route. In the first stage these are *Acacia Barbinervis* (two sites) and in the ultimate scheme, *Hakea cristata, Beaufortia purpurea* and *Petrophile bilobata* (all adjacent to Toodyay Road across the scarp).

A landscaping and planting scheme should accompany each stage of the route, with the aims of minimising noise and visual impacts, rehabilitating cleared areas after road construction, avoiding erosion effects from surface run-off and where appropriate, linking larger stands of existing native vegetation to improve the availability of wildlife habitats.

Farm crossings should be provided if appropriate where the road severs significant areas of land within existing holdings. Eight lots are severed in the first stage to varying degrees; each should be examined to assess the need for separate crossings.

Access along the bridle path in the old railway reserve should be retained across the route. A path across the verges to enable users to cross the road at-grade would probably suffice for the first stage of the route; if a grade separated interchange with Werribee Road is built eventually the path may need to be diverted alongside Werribee Road to cross the junction site.

An archaeological survey of the route would be necessary before commitment to an amendment to the Metropolitan Region Scheme, to establish the presence or otherwise of any archaeological sites in the proposed road reserve.

Construction

Measures should be taken during construction to restrict pollution from run-off, sedimentation of watercourses and nuisances such as dust and construction noise, in accordance with accepted road construction practice. Areas prone to Jarrah die-back should be identified and protective measures taken to prevent the disease being spread, although there are few such areas known along the route. At an early stage, fencing should be erected to prevent farm animals straying onto the construction site.

The first stage of the route is expected to have a surplus of cut material, so imported earthworks should not be required except special materials such as sub-base and road-base. Disposal of surplus material should also cause few problems as there is always a high demand for fill in the metropolitan area. However, appropriate sites should be found for disposal of material that cannot be re-used. Appropriate routes should be identified for construction vehicles; once a haul road is established it would be desirable to ban them from using minor roads.

Any borrow pits that might be required for the works should be identified at an early stage so that their possible environmental, visual and noise impacts may be assessed and management measures identified. The same applies to the location of site offices and machinery compounds.

HILLS SPINE ROAD

Design

The concept for the Hills Spine Road should be developed to a detailed design. The precise alignment of the new section from Red Hill to Roland Road should be determined, considering the effects on hydrology and vegetation, visual impact and the relationship with surrounding development. Once a design is finalised, land should be set aside in future subdivisions to provide for the road.

Adjacent new subdivision layouts should be designed to avoid direct access to the road from individual lots, and houses should be positioned where noise and visual impact from the new road will be minimised.

Construction

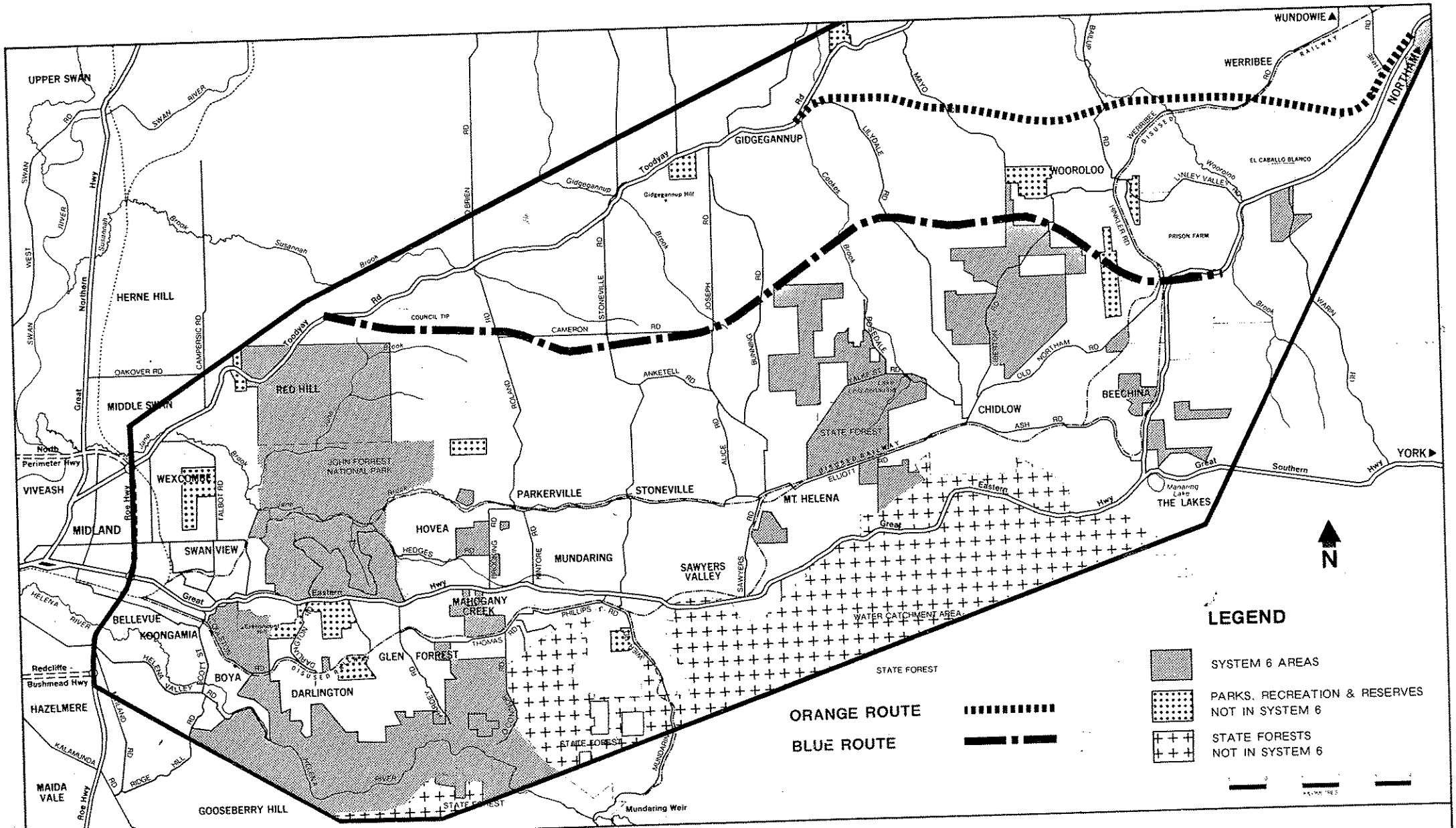
Similar general comments would apply on construction of the Hills Spine Road to those given above for the Orange route.

SUMMARY

The potential environmental impact of the recommended schemes can be considerably reduced by attention to the management measures outlined. In particular the impact of widening Great Eastern Highway on adjacent land and property would be lessened if a land use policy was prepared and if legislation were changed to make compensation sufficient for owners to rebuild on their remaining land should they wish.

The impact of the first stage of the Orange route is for the most part, manageable as described.

In its ultimate form the impact (and the cost) of the Orange route could be significantly reduced if grade separated interchanges were not required.



SOURCE - THE DARLING SYSTEM - SYSTEM 6 OCT 1983
M.R.S. PERTH W.A. AMDT. TO 1ST APRIL 1986

CONSERVATION AND RESERVED AREAS

APPENDIX 4

SUMMARY OF SUBMISSIONS RECEIVED ON THE EASTERN CORRIDOR MAJOR ROAD STUDY

1. DEFECTIVE STUDY

(a) The P.E.R. uses false, misleading or incorrect traffic projections that distort the expected traffic flows in favour of the options selected.

(b) Workable alternative routes were either not considered (eg old railway reserve through John Forest National Park), or were insufficiently canvassed and assessed.

(c) The revised (final) orange route is different to that examined and commented on by the public.

(d) The views of Wooroloo residents and directly affected land owners were insufficiently assessed or taken into account.

(e) Need for upgrading the capacity of an orange route alternative not established.

(f) There are still possible alternatives with potential for less impacts of all sorts, than those discussed.

2. PROPERTY SEVERENCE OR ECONOMIC HARDSHIP

(a) Numerous submissions express shock and anger at direct impact of the proposed alignment of the orange route (and others) on their properties. This includes direct land take, overwhelming physical intrusion or loss of a commercially viable part of a property.

(b) Many submissions express fear of lowered land value, together with inability to sell property at necessary or appropriate value in view of announced proposals.

(c) Many submissions point out that the study's estimate of directly or substantially affected properties is seriously under-estimated.

3. FUNCTIONAL DIFFICULTIES AND ISSUES

(a) No provision for eastward bound traffic to turn onto Orange Route at Toodyay Road -Orange Route junction.

(b) Susceptability of fog conditions on orange route, is considered an unacceptable hazard.

(c) Greenmount alternative is functionally and environmentally unacceptable, and is an inherently unsafe gradient.

4. SPECIFIC LOCATIONAL OBJECTIONS

(a) Total rejection of options 1, 2, 3, 4A, 5 and 5A.

(b) Objection to the re-alignment of Mayo and Lilydale Roads, and the impact on Breeze Road.

(c) Specific objections are raised against the suitability of the existing Toodyay Road, as part of the Orange Route.

(d) Greenmount Hill is inherently unsafe (due to grade), and this can never be adequately overcome.

5. LANDSCAPE AND VISUAL INTRUSION

(a) Visual impact assessment conducted by the study is not balanced, and is biased towards road user perspective rather than affected land owners.

(b) Ameliorative measures for highly visible portion of Lilydale Road are not specified.

(c) Specific concerns of visual intrusion at:

- Clover leaf at Werribee Road;
- batters at Wooroloo Brook and Thirty Nine Gulley;
- cut at Mayo Road; and
- cut and fill at Lilydale Road.

(d) General implications for usual intrusion by the Orange route is unacceptable.

6. RURAL LIFESTYLE AND QUIET BACKWATER SEVERLEY IMPACTED

(a) A majority of all submissions complained forcibly and at length that the Orange Route in particular would have widespread impacts on an area of quiet rural living, valued for that very quality by the majority of landowners. Factors listed included :

- loss of secluded lifestyle;
- severence of a community;
- disruption and destruction of tranquil rural lifestyle;
- shattered lifestyles, uncertainty and inability to move now the proposal is known;
- far wider effect on community than the report supposes; and
- Wooroloo severley impacted.

(b) Many submissions from the Wooroloo, Gidgegannup area argue that the issue of imposed disruption on their community is so serious it is or will become, a major issue.

7. LOSS OF PRIME AGRICULTURAL LAND AND ECONOMICALLY LIABLE PROPERTIES

(a) Disagreement is expressed at the Department of Agriculture's view on the low agricultural value of land affected by the orange route.

(b) Submissions express concern at loss of productive crop land and loss of essential water supplies to specific properties.

(c) Strong objection to the assertion that agricultural activity in the Wooroloo Gidgegannup area is declining.

(d) Several submissions indicate that impact on their specific properties will result in loss of existing commercial viability.

8. NOISE AND OTHER POLLUTION

(a) Study does not recognise low ambient noise levels of the hills area, or the importance of this quality to residents in the hills (Wooroloo area especially etc).

(b) Noise sampling is insufficient.

(c) Many submissions express concern of the widespread effects of both air and noise pollution in a general sense.

(d) Several submissions express specific concerns of chemical spills in hills environment, and impact upon the many creeks crossed and that lead to the Avon and Swan.

9. VEGETATION, ECOLOGY AND RESERVES

(a) Loss of old Toodyay Road reserve and the vegetation it supports.

(b) Orange route in particular will result in extensive tree clearance - a problem in itself, and a contributor to further salinity problems.

10. CREEKS, WETLANDS AND DRAINAGE

(a) Concern is expressed at risk of pollution from chemical spills into creek systems, particular as so many creeks are crossed.

(b) Several submissions raise various concerns at the interference of many creeks and waterways by the orange and blue routes. As well as risk of chemical contamination, fears are expressed in terms of salinity increases, impact on wildlife, interference with effective drainage, and loss of water supplies.

PROPONENT'S RESPONSE TO ISSUES RAISED

EASTERN CORRIDOR MAJOR ROADS STUDY

Response to issues raised by EPA in connection with the PER, following EPA review of submissions received. Issues raised under headings 1, 2, 3 and 4 do not appear to be environmentally oriented, but they have been commented upon in order to assist the evaluation process.

1. DEFECTIVE STUDY

The study has been carried out under the direction of a highly responsible firm of consulting engineers (Travers Morgan Pty Ltd) with staff support from SPC, MRD and the Shires of Mundaring and Swan.

The procedures and data used were as comprehensive and accurate as possible with no hidden bias.

An extensive range of route options including the old railway reserves were examined in previous studies. These are described more fully in Chapter 5 of the December 1986 Preliminary Report.

Public consultation and the views of residents were an important aspect of the route selection process. This is evidenced by the fact that the preliminary location of the Orange Route was adjusted to take into account the results of the public consultation process, and to minimise its environmental and social impact.

2. PROPERTY SEVERANCE OR ECONOMIC HARDSHIP

The ECMRS final report acknowledges that the effect of the Orange Route on a number of rural properties will be significant. In the ultimate stage a total of 116 lots would be affected, 10 wholly, 97 in part and 9 severed. (See Table 13.1 page 86) The number of lots affected is greatly reduced in the first stage, and the impact of the proposed route on many affected lots is only marginal.

During major road studies the owners of land or buildings that would be affected by routes under consideration inevitably suffer some degree of hardship until such time as a decision is made. Until the affected land is in the process of being reserved there are no grounds for compensation.

As soon as the statutory process to reserve land for road purposes is initiated through the gazettal of an amendment to the Metropolitan Region Scheme (MRS) or a planning control area, the owners of land affected by the proposed reservation became eligible for compensation under the terms of the MR Town Planning Scheme Act. However, it must be stressed that only owners of land directly affected by the reservation became eligible for compensation. There is no provision for compensation to the owners of land adjacent to a reservation or persons indirectly affected by impacts such as vehicle noise, visual intrusion or other perceived forms of amenity loss.

Every possible impact is taken into account in the selection of a preferred strategy by means of the assessment framework approach which is a form of multi-criteria analysis. (See Table 15.1 page 100)

3. FUNCTIONAL DIFFICULTIES AND ISSUES

(a) Provision for eastbound traffic to turn onto the Orange Route at the Toodyay Road-Orange Route junction is not warranted due to low traffic volumes and the availability of alternative routes.

Traffic from Toodyay Road, seeking eastbound movement along the Orange Route, can do so via Bailup Road or Mayo Road. The route via Lilydale Road, Breeze Road and the Mayo Road/Orange Route junction provides another alternative which would be particularly attractive to local traffic movements in the vicinity of the Toodyay Road/Orange Route junction.

(b) Evaluation of the Orange Route in terms of its susceptibility to fog requires visibility records over long periods at a number of locations along the route. Such data is not available, and route selection based on the susceptibility to fog cannot be sustained. The use of fog signs and lighting will be considered at the design phase of the route if fog is considered to constitute a hazard.

(c) The major advantage of the Orange Route when compared to GEH is that, because development along the former route is predominantly in the embryonic stage (unlike that along Great Eastern Highway) the opportunity is more readily available to accommodate a high standard route. Measures available include:

- controlling the number of accesses onto the highway
- upgrading the standard of road junctions
- improving the standard of road curves

These measures will all contribute towards a safer and more relaxing driving environment. (See also issue4(d)

4. SPECIFIC LOCATIONAL OBJECTIONS

(a) Total rejection of options presumably refers to the earlier rejection of other routes shown on the attached plan. (Tentative short list of routes) It is, therefore, answered by (1) above.

(b) MRD Plan 8721-47 (Appendix E of the Final Report) indicates that only superficial realignment is necessary at Mayo and Lilydale Roads and that there will be no impact on the manner in which Breeze Road functions at present.

(c) Toodyay Road is being upgraded by MRD at the present time and will be to a satisfactory standard to handle the type and volume of traffic anticipated at the turn of the century. East of the scarp this will be less than 11,000 vehicles per day. (See Fig 6.11 Preliminary Report and p45 of the Final Report)

(d) The issue of gradient is complex and an economic analysis of vehicle operating costs and time saving is not warranted. It is generally accepted that the effect of adverse grades on passenger cars is not appreciable up a gradient of 7% and for trucks up to 3%.

A comparison of adverse grades for improved alignment along Great Eastern Highway, the Brown/Yellow and Orange Routes is:

Length of Grade in Metres

Gradient	GEH	Brown/Yellow	Toodyay Road
> 3%	470	1100	2100
> 4%	780	1000	1100
> 5%	1530		-
> 6%	1220		-
Approx 7%	-		1000
Total	4000		4200

It is clear that there is very little difference in the total length of adverse grade via either Great Eastern Highway or Toodyay Road, but the length of grades in excess of 5 per cent is approximately three times greater via Great Eastern Highway. It is neither economically nor environmentally feasible to improve gradients along the existing routes.

The Brown/Yellow routes would provide lower gradients across the scarp, but these routes were rejected due to strong opposition from local residents, cost, environmental impact and other factors.

An accident study of the Greenmount section of GEH found that truck accidents represented 10% of all reported accidents which occurred over the four and a quarter year period from January 1983 to March 1987. Daily truck traffic is estimated to be in the order of 10%. Trucks, therefore, do not appear to be over represented in accidents. Furthermore, of the 19 truck accidents only 5 (26%) involved trucks losing directional control.

Trucks, however, have a greater impact on the overall accident situation than that reflected by the number of truck collisions. Because of the steep grade, trucks are responsible for creating the high risk vehicle speed differentials which contribute to accident occurence. Therefore by diverting the majority of interstate truck traffic from GEH, safety on GEH would be enhanced. (See also issue 3(c))

5. LANDSCAPE AND VISUAL INTRUSION

It is not agreed that the visual impact assessment is biased towards the road users' perspective. Viewsheds were plotted manually, and it was not considered practical to plot multiple viewsheds from every vantage point on a property. They were therefore plotted from occupied houses, which were considered to be the most critical viewing points. Appendix 1 of the Visual Impact Assessment Report (see Eastern Corridor Major Roads Study Technical Papers), contains eight pages of detailed assessment of views from houses and from local roads.

The recommendations list general ameliorative measures which will be considered during the design phase of a project. Mitigation of any visual intrusion at Wooroloo Brook, Thirty Nine Gully, Mayo Road, Lilydale or Werribie Road would also be considered during the detailed design and rehabilitation phases.

6 RURAL LIFESTYLE, ETC

As stated in Chapter 15 of the report, an assessment framework approach is used to present the impacts of the options under consideration.

The report acknowledges that the Orange Route can only be implemented "at a certain environmental, social and financial cost" but notwithstanding these impacts, it is considered preferable to doing nothing, and meets the study objectives better than all other options considered.

The loss of rural amenity can be minimised through careful design, construction and landscaping. Local access between communities in the Gidgegannup, Wooroloo and Wundowie area can be maintained until such time as a dual carriageway with full control of access is required ie until well into the 21st century.

Uncertainty with respect to future intentions is inevitable when major studies of this type are undertaken. Such uncertainty will not be completely resolved by a decision to accept the Orange Route as a planning objective as the time scale for implementation will still be unknown.

7. LOSS OF PRIME AGRICULTURAL LAND AND ECONOMICALLY VIABLE PROPERTIES (See also Item 2)

The Study Report states that:

"The area does not have any special significance to the Department of Agriculture."

On a broad, overall scale, the affected land is not considered to have any special farming qualities peculiar to this region. However, the existence of a number of existing specialist farming activities has been noted. Indeed, the Study Report suggests that detailed investigations to see how adverse effects on these activities can be minimised should be considered.

Following recent talks with representatives of the University of Western Australia, the special research activities being undertaken by the University on land affected by the Orange Route have been recognised. Further consideration will be given to the special needs of the University during the Metropolitan Region Scheme (MRS) amendment stage of this project.

Any decision to adopt the Orange Route, and include it in the MRS, would not have an immediate physical effect. This would only occur in the future when construction takes place, and the loss of some artificial water suplies would be inevitable. However, all such supplies would be relocated, reconstructed, or financially compensated for.

Where construction of a road results in the loss of commercial viability of a property that is <u>directly affected</u>, this is taken into account in determining compensation. However, properties not directly affected have no rights to compensation.

8 NOISE AND OTHER POLLUTION

(a) Introduction of a new major road will always have a major noise impact. One of the objectives of the study was to minimise this impact on existing residences.

Paragraph 3 of Chapter 10 (The Human Environment) of the Study Report deals with "Noise". It recognises that, in areas remote from major roads, existing noise levels are low and are associated with natural rather than artificial sources such as traffic. The importance that residents place on the existing tranquillity is noted in paragraph 4.

Chapter 13 (Impact on the Human Environment) discusses the assessed noise impact of the Blue and Orange Routes. Table 13.3, in the section entitled "Noise Climate", indicates the degree of change that is expected in these areas, and that fewer homes are affected by the Orange Route than the Blue Route. This factor contributed towards the selection of the Orange Route as the preferred option.

(b) The Traffic Noise Report (see ECMRS Technical Papers) contains details of the noise measurement programme which establishes existing levels. Results in Appendix B exhibit consistency in noise levels along GEH and Toodyay Road and reduced levels along local roads indicating that measurement sites were representative of the various acoustic environments.

(c) See above.

(d) See Item 10.

9. VEGETATION, ECOLOGY AND RESERVES

The extent of vegetation loss would depend on the precise configuration of the road. An objective of detailed design and construction would be to retain existing plant population as much as possible.

A landscaping and planting scheme is recommended to accompany each stage of the route. The aims will be to minimise noise and visual impacts, rehabilitate cleared areas after road construction, avoid erosion effects from surface run-off and, where appropriate, link larger stands of existing native vegetation.

It is expected that the rehabilitation of cleared areas within the road reserve will help compensate for the loss of vegetation associated with the roadworks. Consequently the effect of tree clearance on the salinity problems would be insignificant.

The ECMRS Report recommends that in the first stage, a new, high standard single carriageway along the Orange Route should be constructed. The new route would be suitable for eventual upgrading to national highway standards. Consequently, the first stage works (including some minor upgrading works on Toodyay Road) would have significantly less impact on the vegetation than the ultimate works. In addition, the staging of construction would enable the rehabilitation of some vegetation to occur prior to the final works, thereby minimizing the overall perceived impact.

10 CREEKS, WETLANDS AND DRAINAGE

All new crossings along the Orange Route would be designed to avoid disruption to natural drainage regimes and hence creek vegetation and habitats. Bridges may prove preferable to culverts at some locations.

Detailed design of road drainage would include careful selection of discharge points into watercourses to minimise the risk of pollution from road run-off.

Specific concerns regarding chemical spills will be addressed in the detailed design and construction phases of the route. Sedimentation basins lined with limestone could be used to filter pollutants if considered necessary.

PETER WOODWARD

28 October 1988

pw:cb

State Planning Commission
Main Roads Department
Shires of Mundaring and Swan

EASTERN CORRIDOR MAJOR ROADS STUDY

SUPPLEMENTARY PAPER ON ALTERNATIVES NORTH OF ORANGE ROUTE

55/88.
ENVIRONMENTAL PROTECTION AUTHORITY
24 JUN 1988
File No. 107/86. Initials PH

Travers Morgan Pty. Ltd.
June 1988

019128 (WP)

CONTENTS

		Page
1.	INTRODUCTION	1
2.	ROUTE ALTERNATIVES	2
3.	IMPACT OF ROUTES	6
4.	SUMMARY AND CONCLUSIONS	10

SECTION 1 - INTRODUCTION

This Eastern Corridor Major Roads Study (ECMRS) Supplementary Paper is prepared to give additional information on alternative routes for a National Highway to the north of the Orange Route.

1.1 Background

On completion of preliminary studies and as described in Chapter 10 of the Preliminary Report (Travers Morgan, December 1986), our initial recommendations for a short list of routes for further study were considered by the Eastern Corridor Steering Committee, Mundaring and Swan Shire Councils and the Eastern District Planning Committee. Amongst resolutions from these bodies, Mundaring Shire Council asked the Consultant "to direct part of his further investigations of the Orange route east of Lilydale Road, to the area north of that shown on the plans released during the study" (i.e. north of the Orange route).

With the benefit of the views of the abovementioned bodies the Commission adopted a set of recommendations for further study, including to "further investigate the Blue and Orange route options for selection of a new main route through the Eastern Corridor. The views of the Shires of Mundaring and Swan will be taken into account in determining the preferred option".

In Chapter 11 of the Preliminary Report we stated that, in studying the Blue and Orange routes, we would examine "a realignment of the Orange route north of its preliminary position east of Lilydale Road."

During the detailed study phase, which culminated in preparation of the ECMRS Final Report (Travers Morgan, February 1988) the question of realigning the Orange route further north was examined by the study team. Initial investigation showed that a route substantially further north was not desirable, and small variations were made to the preliminary alignment of the route which moved it slightly further north in the vicinity of Breeze and Werribee Roads, where the greatest impact on people and property was likely.

As stated in Chapter 6 of the final Report (page 35), "a substantial northward relocation of the Orange route east of Gidgegannup (as suggested by Mundaring Shire Council) was ruled out because the topography and natural landscape north of the preliminary alignment would have introduced considerable engineering difficulties and lengthened the route."

This paper elaborates on that statement by presenting information on specific northern alternatives to the Orange route, details of which have been developed by the Main Roads Department (MRD) in response to local objections to the Orange route from the Wooroloo community.

1.2 Structure of This Paper

Following this introduction, Section 2 describes the route alternatives developed by MRD as being representative of alignments north of the Orange route. Section 3 discusses the route's impacts and likely costs, and Section 4 gives our conclusions.

1.3 Acknowledgment

We would like to acknowledge the work undertaken at short notice by MRD on these routes, and note that the diagrams and costs herein were prepared by MRD for the study team.

SECTION 2 - ROUTE ALTERNATIVES

The area north of the Orange route is typical of the outer parts of the Eastern Corridor, comprising fairly large tracts of cleared land (mostly used for grazing of stock) interspersed with stands of natural vegetation of varying sizes, and extensive areas of reserves (mostly for timber). In comparison with the vicinity of the Orange route, lots are larger and the topography is generally more undulating, with a number of relatively substantial hills and valleys.

When examining the area for route alternatives, it is apparent that a number of significant constraints exist, bearing in mind the geometric requirements and the east-west direction of the route. The main physical constraints to planning a major highway route are:

i Wundowie townsite and settled areas to the south and west;
ii Timber reserves forming System 6 areas C28 and C29;
iii Wooroloo and Cookes Brook valleys, including the Noble Falls area;
iv Bakers Hill and other settled areas along Great Eastern Highway; and
v Settled areas along Toodyay Road as far north as Bailup Road.

It is emphasised that because mapping and air photography coverage of the area is somewhat limited, route identification and assessment is not to the same level of detail as that undertaken for the Orange route. However we consider that the alternative routes identified are representative of the best possible solutions, given the constraints.

Figure 1 shows the route alternatives A, B and C which were identified as representative routes by MRD. The routes are described in more detail in the following paragraphs.

2.1 Route A

Route A leaves Toodyay Road east of Gidgegannup and follows the Orange route alignment as far as Dinsdale Road. East of there the route swings northward to cross Rahnie Road and Wooroloo Brook, continuing north eastward to to skirt the northern boundary of Reserve 14275 (Timber) and crossing Fernie Road 3km north of Wundowie. The route then swings eastward again crossing Bakers Hill Road before joining Great Eastern Highway at the so-called 'Clackline Deviation', north-east of Bakers Hill. The total length of new road construction is about 30km.

A small variation to Route A, called Route A1 in Figure 1, has a more favourable vertical alignment (avoiding a substantial cutting) but adds an additional kilometre to the length of the route.

The first stage of Route A is estimated to cost about $50 million (Route A1 is about $49 million, as it saves some significant earthworks).

2.2 Route B

Route B is a possible alternative to Route A, leaving the Orange route alignment about one kilometre west of Dinsdale Road and crossing Wooroloo Brook north of Route A. The intention of this route is to examine an alternative crossing of Wooroloo Brook further away from Rahnie Road (where some houses exist), but the route was not examined east of Bailup Road because the very large earthworks required across the Brook rule it out as a practical option.

2.3 Route C

Route C follows Toodyay Road past Noble Falls and Bailup Road. The route follows a new alignment east of Bailup Road through hill country, and joins Route A at Fernie Road about 3km north of Wundowie. From there eastwards the route is common with Route A.

Route C involves about 23.5km of new road construction between Toodyay Road and Great Eastern Highway, and the first stage cost would be about $37 million.

2.4 Summary

Table 1 shows lengths and costs for the two main route alternatives A and C, sub-option A1, and the Orange route for comparison.

TABLE 1 Route Lengths and Costs (Source: MRD)

	First Stage			Ultimate Development *		
	Length (Km)	Cost ($M)	$M Per Km	Length (Km)	Cost $M	$M Per Km
Route A	30	50	1.7	30	83	2.8
Route A1	31	49	1.6	31	82	2.6
Route C	23.5	37	1.6	31.5	90	2.9
Orange Route	17	20	1.2	29	71	2.5

* Lengths and total costs for ultimate (long term) development to notified National Highway standards (dual carriageway with grade separated interchanges) are from common points in the east and west, for direct comparison.

The summary emphasises not only that the northerly routes are longer than the Orange route, but also that they would cost more per kilometre in both the first stage and in their ultimate development. This reflects the more difficult terrain likely to be encountered, with more substantial earthworks required.

It should be borne in mind that the estimated cost for the Orange route arises from detailed studies and optimisation of the alignment, whilst those for Routes A and C are broad estimates at a planning level of detail. However, we are satisfied that the differences in costs suggested by these figures are realistic.

SECTION 3 - IMPACT OF ROUTES

The likely impact of routes A, B and C is discussed below, following the same headings as the ECMRS Final Report.

It should be noted that the northern routes are not assessed to the same level of detail as the Orange route; the impacts described are indicative only.

3.1 Impact on the Natural Environment

Soil and Landform Stability

Given that full engineering and drainage design would be undertaken for any option taken forward, including landscaping and planting details, the routes' effects on soil and landform stability would be manageable. However, in comparison with the Orange route, northern routes have more substantial earthworks requirements, and the Wooroloo Brook crossing with Route A or B would require special attention.

Hydrology

Routes A and B cross Wooroloo Brook at points where substantial earthworks would be required. The effects on the local land drainage regime would need careful consideration; a substantial adverse impact is likely.

Route C has a generally lesser impact on creek systems and land drainage, except along Toodyay Road past Noble Falls,which follows the Wooroloo Brook valley for some distance. If this section requires significant improvement as part of a National Highway route the impact on land drainage could be significant.

Vegetation

Little is known about vegetation types in the vicinity of the northern routes. Routes A and B would affect creek vegetation around Wooroloo Brook, and the edges of large intact stands of woodland (probably Jarrah-Marri) in System 6 and C28.

Route C would affect some smaller but still significant areas of natural vegetation (probably Jarrah-Marri woodland) at several places along its length.

The effects of northern routes on vegetation are expected to be substantially greater than those of the Orange route.

Wildlife

As the northern routes pass through areas of lower human habitation than the Orange route, and also sever areas of natural habitat from each other, the effects on wildlife would probably

be greater than the Orange route. Corridors for the movement of species would be disrupted, and intact areas for maintenance of animal populations would be reduced.

Conservation Areas

Route A (and possibly Route B if it was extended) affects the northern edge of Reserve 14275 (Timber), part of System 6 area C28. No other known reserves are affected.

Route C could have an impact on reserved lands around Noble Falls if the existing road requires further upgrading. Reserve 2146 (Recreation) in particular may be affected.

3.2 Impact on the Human Environment

Northern routes pass through areas of generally lower human habitation than the Orange route; their effects on people and property might be expected to be less. Individual impacts are discussed below.

Land Use

Based on much less detail than the Orange route (and therefore indicative only) the northern routes could affect the following numbers of private properties directly, with land take or severance.

TABLE 2 Possible Direct Impact on Property

Route	Total Lots Directly Affected In First Stage (new route only)	Long Term[1]	TOTAL
A	40	90	130
B	Similar to A	Similar to A	Similar to A
C	25	110	135
Orange Route	26	115[2]	140

1. Including improvement of Toodyay Road in the longer term (not assessed west of Campersic Road).
2. Including improvement of GEH from Wundowie to Clackline, not required with routes A, B or C.

Although the northern routes pass through areas where the blocks are generally larger, their additional length means that greater numbers will be affected directly. Furthermore it is likely that severance effects will be greater than with the Orange route.

The numbers of houses or buildings taken cannot be precisely assessed. Route A would take at least one house in the first stage (where it is common with the Orange route at Lilydale Road). In the longer term, excluding works from Gidgegannup westwards, Route C could affect up to ten buildings along Toodyay Road to Bailup Road, including the Noble Falls Hotel.

For comparison purposes, improvement of Great Eastern Highway to the Clackline Deviation must be taken into account with the Orange route, as this work would not be necessary with northern routes. It is not possible to estimate a precise figure, but 5 to 10 buildings could be affected primarily through Bakers Hill.

Significant Sites

No known sites of historical, archaeological or aboriginal significance are affected by northern routes, except the Noble Falls vicinity with Route C in the longer term. This area is of recreational importance and could have significance to aboriginal groups (although this is not substantiated).

As the northern routes affect more areas of natural vegetation and undeveloped land than the Orange route, the chances of archaeological finds would probably be greater.

Noise Climate

The northern routes would affect less people with traffic noise than the Orange route. In terms of estimable changes in noise level the Orange route affects 16 properties significantly. All routes would affect people who currently enjoy a setting largely free of any traffic noise, however slight, and this wider effect on lifestyles can be expected to be greater with the Orange route than with Route A. Route C on the other hand could have adverse effects due to traffic increases on Toodyay Road past Noble Falls. About 30 properties could be affected; the net effect could approach or even exceed that of the Orange route.

Air Quality

It is considered that all route options would have no discernible effects on air quality for the reasons given in the Final Report (page 90).

Visual Quality and Amenity

The visual impact of the northern routes is unknown in detail. Site inspection suggests that the routes would not be widely visible because of the hilly nature of the terrain. However, particular areas where significant adverse effects could be expected are:

i Wooroloo Brook crossing (routes A and B)
ii Fernie Road crossing (all northern routes)
iii Noble Falls area in the longer term (route C)

The general area that the northern routes affect is of a higher visual quality than that of the Orange route, so we consider that northern routes would have a greater adverse effect.

Community Facilities and Structure

The severance effects of northern routes on communities (rather than individual properties) will not generally be significant, as north-south access roads would be maintained across the routes. Outlying properties will be severed to a degree from Wooroloo and Wundowie, but this will probably not be significant. Fewer people will gain the advantages of improved access than with the Orange route.

The greater length of the northern routes (see below) will probably result in less traffic diverting from Great Eastern Highway. The beneficial effects of traffic relief (significant through Mundaring and Sawyers Valley) on GEH would be less than the Orange route, especially with Route C.

Road Users' Environment

The northern routes are longer than the Orange route, and therefore are slightly less convenient and attractive as alternatives to Great Eastern Highway for through traffic.

Comparative journey lengths (Clackline to Roe Highway) are as follows:

Via Great Eastern Highway	:	57 Km
Via Orange route	:	51 Km
Via Route A (or B)	:	52 Km
Via Route C	:	53.5 Km

Northern routes, especially route C offer less of a distance saving than the Orange route. With route C, unless substantial and costly improvements are made to Toodyay Road past Noble Falls, the poor road standard would make the route still less attractive for through traffic, particularly heavy vehicles.

SECTION 4 - SUMMARY AND CONCLUSIONS

The northern routes A and C (considered representative of possible northern alternatives) are compared below, and the best of the two is then compared with the Orange route.

4.1 Route A Versus Route C

The advantages of Route A over Route C are:

- Lower long-term development cost (although the first stage cost is substantially higher);
- Shorter route length (Route C is 1.5Km longer than Route A);
- No impact on reserved land around Noble Falls;
- A slightly lesser long-term impact on properties, (although first stage impact is substantially greater);
- Probably fewer surrounding properties affected by noise impact; and
- Improved access to Toodyay Road and Midland for a greater number of people.

The advantages of Route C over Route A are:

- Lower initial cost (although long-term development cost is higher);
- Slightly lesser impact on local creek systems;
- No impact on System 6 and C28; and
- Fewer properties affected in the first stage (although in the longer term slightly more properties will be affected).

On the basis of this comparison Route A is considered preferable to Route C. The route has a significantly higher initial development cost ($50M compared to $37M), although in the long term it could cost less to upgrade to full national highway standards. The various impacts of Route C on the Noble Falls section of Toodyay Road are of considerable concern; Route A avoids these impacts.

4.2 Route A Versus the Orange Route

The advantages of Route A over the Orange route are:

- Lesser long-term direct impact on properties (although more properties would be affected by land take in the first stage);

- Probably fewer people affected by traffic noise impact; and
- A slightly lesser community severance effect.

The advantages of the Orange route over Route A are:

- Substantially lower development costs for both first and ultimate stages;
- A slightly shorter route for through traffic;
- Less impact on hydrology and watercourses;
- Less impact on natural vegetation and wildlife;
- Less impact on conservation areas; and
- Fewer properties affected by land take or severance in the first stage (although the long term effect may be slightly greater).

On the basis of the above the Orange route is considered preferable to Route A, primarily because of the substantially lower cost implications and the lesser effect on the natural environment (hydrology, vegetation, wildlife and conservation areas). Furthermore the Orange route will probably directly affect fewer properties than Route A in terms of land take and property severance, but more people will be affected by secondary impacts (noise and visual intrusion).

When the Orange route is compared to Route C many of the above observations still hold true, and so the Orange route is considered preferable to Route C also.

4.3 Conclusions

Northern alternatives to the Orange route have been shown to have a greater impact on the natural environment, and substantially higher cost implications.

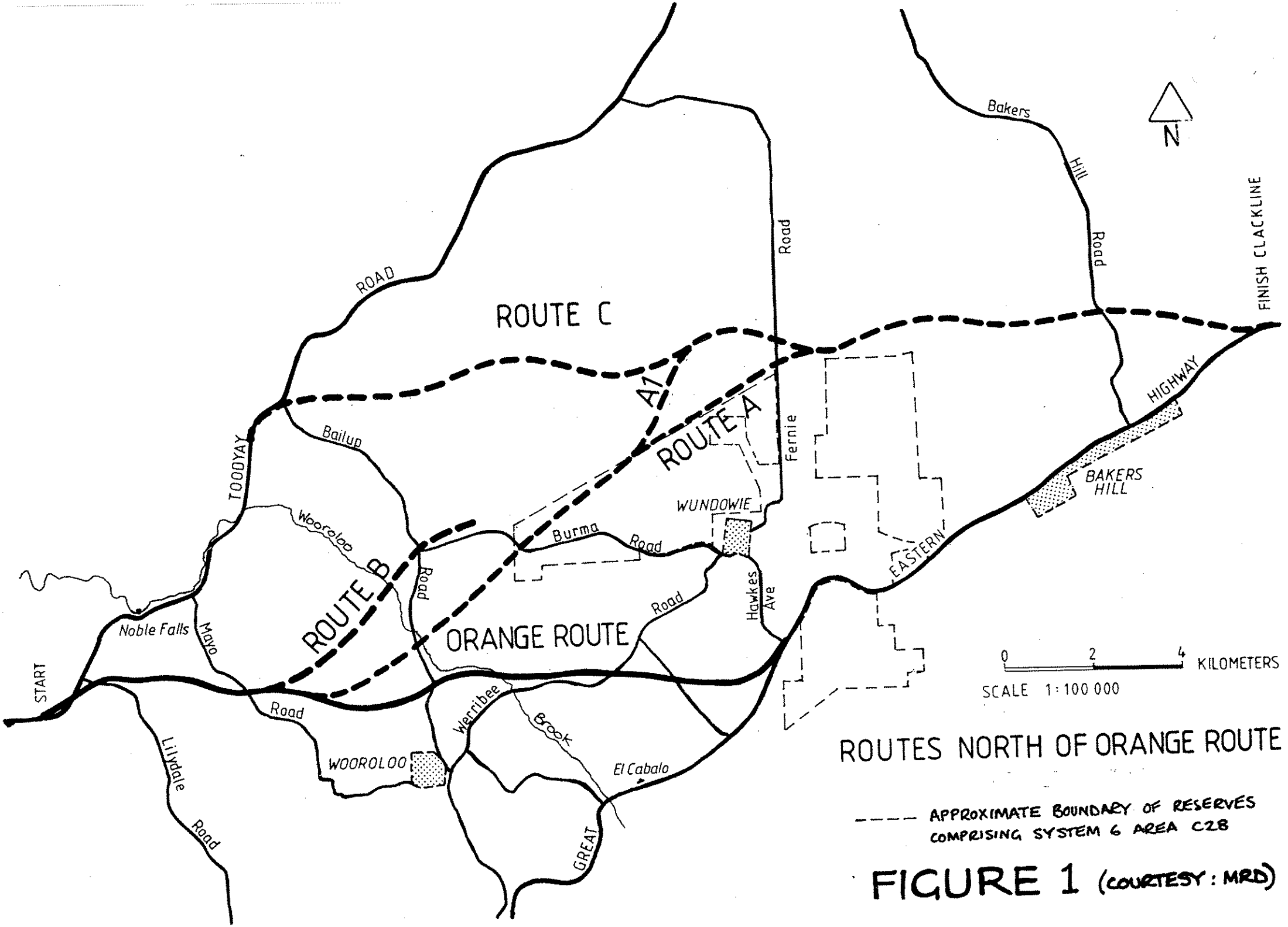
The possible saving in impact on property and people is not as great as might be expected; routes such as route C using Toodyay Road past Noble Falls are at a particular disadvantage, whilst routes such as route A still affect the human environment significantly; indeed the initial effects on property are significantly greater than the Orange route.

The conclusion to be drawn from this evaluation is that the Orange route is preferable to any typical northern alternatives. Whilst the impact on people and property is of acknowledged concern, there are no substantial improvements to be made in this regard by routes to the north, certainly not enough to justify the considerably greater costs and natural environmental impacts that would result.

We consider that the final recommendations of the ECMRS Final Report are unaffected by the assessment presented herein. In particular we emphasise the need to review ultimate design standards for the National Highway route in respect of grade separation at junctions, where a substantial amount of the long term impact and cost occurs. The environmental management measures given in the last chapter of the Final Reports should be pursued with the aim of minimising the overall impact of the Orange route, if the route is adopted.

* * * * *

Travers Morgan
June 1988



ROUTES NORTH OF ORANGE ROUTE

---- APPROXIMATE BOUNDARY OF RESERVES COMPRISING SYSTEM 6 AREA C28

FIGURE 1 (COURTESY: MRD)